

CASE REPORT

# Complex Alpine Extrication: Case Report of Mountain and Speleological Rescue Cooperation

Piersandro Sette, MD; Mauro Carlini, MD; Damiano Berti, MD; Igor Rucci, MD; Francesco Marchiori, MD; Fausto Toffali, MD; Alberto Schonsberg, MD; Giorgio Ricci, MD; Stefano Tardivo, MD

*From the Intensive Care Unit (Dr Sette); and the Helicopter Emergency Service (Dr Toffali), Department of Emergency, G. Fracastoro Hospital, San Bonifacio, Italy; the Department of Emergency and Intensive Care Unit, Azienda Ospedaliera Universitaria Integrata (Dr Carlini); the Department of Public Health and Community Medicine, Hygiene and Environmental Occupational Preventive Medicine Division (Drs Berti, Rucci, Marchiori, Tardivo); the Toxicology Unit, Emergency Department, University of Verona (Dr Ricci); and the Emergency Medical Service of Verona (Dr Schonsberg), Verona, Italy.*

Mountain sporting activities are an increasingly popular practice that exposes mountaineers to a high risk of adverse events. This report describes a unique case of recovery in an austere environment that involved explosives. In June 2012, a 52-year-old man ascended a cliff tower in the Eastern Alps, Italy. A landslide occurred, and a boulder crushed the climber against a large stone located farther down the cliff, causing compression of the lower limbs and the pelvis with consequent severe musculoskeletal trauma. The National Alpine and Cave Rescue Unit (NACRU) arrived and proceeded with stabilization of the injured climber, which took 6 hours and involved a difficult extrication supported by the Cave Rescue division of NACRU. Unfortunately, during transport to the trauma center of Borgo Trento, Verona, the patient exhibited signs of progressive traumatic shock because of crush syndrome, hypovolemia, and acidosis, which led to cardiac arrest and death. Based on an extensive literature review, this report was determined to be the only one of a mountain rescue using explosives for the extrication of a victim in the Northeast Italian Alps. This case describes how a rescue in austere environments can represent a high-risk situation, and it shows how improvisation and cooperation between rescue teams are crucial for a successful recovery.

*Key words:* rescue, mountain, trauma, shock, explosive, landslide

## Introduction

Some of the best climbing cliffs in Europe are located in the Eastern Alps in Italy. Most are not difficult, so a growing number of people visit each year, not all of whom are expert climbers. Regardless of the cliff's grade, rock climbing is associated with a high risk of injury for climbers.<sup>1,2</sup> A case is presented of the rescue of an injured climber using innovative techniques, such as a mini-charge of explosives, during the extrication of the accident victim in the Northeast Italian Alps.

**Disclaimer:** The contents of the article are the author's sole responsibility. They do not represent the views of the Azienda Ospedaliera Universitaria Integrata of Verona or its staff. Any inquiries related to the contents of this article and all permission to cite should be addressed to the author.

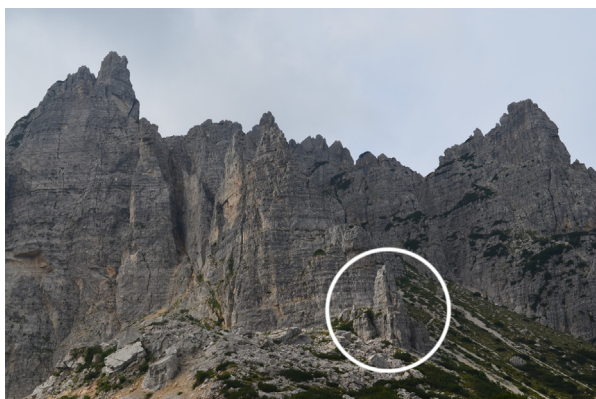
Corresponding author: Francesco Marchiori, MD, Department of Public Health and Community Medicine, Hygiene and Environmental Occupational Preventive Medicine Division, Istituti Biologici II-Blocco B, Strada le Grazie 8, 37134 Verona, Italy (e-mail: framarchiori@gmail.com).

Rescuers are often involved in dangerous environmental situations that expose them to high risks during operations.<sup>3</sup> The ability to adapt to varying environmental conditions and situations is one of the skills required in a qualified rescue team, and it is essential for the success of the rescue. In addition, in an austere mountain environment, a longer recovery time is required compared with traditional salvage protocols. The evaluation of an injured person takes place under difficult conditions, with only basic diagnostic procedures and a limited set of therapeutic options available.<sup>3,4</sup> The ability to achieve optimal outcomes under these conditions is the result of a combination of teamwork, improvisation, and training. This report describes the intervention of a helicopter-transported medical team and the use of explosives as an example of how the recovery of an injured person in mountainous terrain can be complex and dangerous for both the patient and rescuers.

## Case Report

In June 2012, a 52-year-old man went to the Eastern Alps (Italy), which are approximately 1600 m above sea level, to climb a Grade III route on a rock tower (Figure 1). The weather conditions were good, with clear skies, unlimited visibility, and mild temperatures. At approximately 2:30 PM, there was a landslide from the climbing wall, and a boulder hit the climber, crushing him against a large stone below. The stone crushed his lower limbs and partly crushed the man's pelvis, preventing any movement of the legs and causing severe musculoskeletal trauma. Other climbers had witnessed the accident and called emergency services. A helicopter (model EC-145 Eurocopter BK 117) from the Verona Emergency Service took off from the heliport of Verona with an emergency healthcare team (emergency physician, nurse, and alpine guide of the National Alpine and Cave Rescue Unit [NACRU]), arriving on the scene of the accident at 2:50 PM.

After an aerial survey, the rescue team members disembarked from the helicopter and quickly built rigging to hold the rock wall above the patient to prevent further collapse (Figure 2). At 3:15 PM, the doctor and the nurse were able to attend to the victim. The primary survey revealed that the patient was responsive and breathing, with a Glasgow Coma score of E4V5M6 (13 of 15). The Revised Trauma Score was 12. The patient's heart rate was 130 beats/min, his blood pressure was 130/80 mm Hg, and his pulse oximetry saturation level was 98%. The doctor counted a respiratory rate of 18 breaths/min. The lower legs and part of the pelvis were trapped under a rock measuring approximately 6 m by 2 m. The femoral pulse could not be checked. The man had suspected fractures of the pelvis, femurs, and right wrist. Many superficial abrasions were detected, but there was no evidence of external hemorrhaging.



**Figure 1.** View of mountain group and tower rock in the white circle.



**Figure 2.** Security procedures of the accident site.

The patient's helmet had been removed, and a cervical collar had been placed. The pelvis was not completely trapped, and the prehospital team was able to apply a pelvic binder. Oxygen was delivered through a face mask at 4 L/min. An IV catheter was placed, and fluids were infused. The patient received 1500 mL of crystalloid solution, 2000 mL of colloids (Gelofusine), and 300 mL of glucose 5% infusion. Fentanyl, morphine, and ketamine were used for pain management. IV fluids were warmed with an IV fluid warmer sack, and a thermal blanket was used to reduce heat loss.

Simultaneously, the rescue team attempted to remove the boulder using a block and tackle, but they were unsuccessful. Another attempt involved the use of winches, but the excessive weight of the rock made the operation impossible (Figure 3). The ineffectiveness of numerous attempts to move the rock prompted NACRU to request support from the Cave Rescue division. This elite division of NACRU specializes in the wilderness rescue of victims trapped in cave environments. After they arrived at 6:45 PM, the technical cavers decided to use microexplosive charges. Two holes were drilled into the rock using a hammer drill, and the holes were then filled with the charges. The positions and depths of the holes were determined by a carefully constructed pattern,

Download English Version:

<https://daneshyari.com/en/article/2613437>

Download Persian Version:

<https://daneshyari.com/article/2613437>

[Daneshyari.com](https://daneshyari.com)